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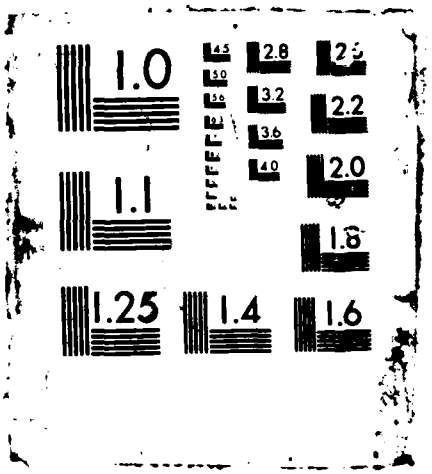
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Product Performance Feedback System (PPFS)
FINAL REPORT

WSMIS
WEAPON SYSTEM MANAGEMENT INFORMATION SYSTEM

17 JULY 1985

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Prepared For:
UNITED STATES AIR FORCE
AIR FORCE LOGISTICS COMMAND
Logistics Management Systems Center
WRIGHT-PATTERSON AFB, OH 45433

DRC DYNAMICS RESEARCH CORPORATION
WILMINGTON MA 01887

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Contract Number:
F33700-83-C-0038
CDRL Sequence Number: AD01

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Prepared By:
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SECTION 1 - GENERAL

1.1 PURPOSE OF THE TECHNICAL REPORT

The purpose of this final technical report for the Product Performance System (PPFS), Contract Number F33700-83-C-0038, CDRL #AB08, is to summarize the work accomplished under Phase II of this contract and to make recommendations on how to proceed with the contract objectives.

As stated in the original Statement of Work (SOW), the objective of the Product Performance Feedback System was to create "a convenient, usable, central repository of design related operational, maintenance, and reliability data, as well as other support and cost data to be collected and used throughout the life cycle of a weapon system". This central repository for data would contain all of the AFLC "lessons learned", which would help the design community develop a technology investment strategy to resolve problems on existing and future weapon systems.

This report describes the evolution of the PPFS effort and the work accomplished under the contract. The report consists of four sections. The first section provides an overview of this document and other documents related to the PPFS program. The second section provides an overview of the PPFS project and a brief summary of the work done during the tenure of the contract. The third section describes the results obtained during the PPFS development. The final section presents the conclusions reached and the recommendations to be made about the PPFS effort.

1.2 PROJECT REFERENCES

The Product Performance Feedback System (PPFS) project was conducted for Headquarters, Air Force Logistics Command (HQ AFLC), by Dynamics Research Corporation (DRC), Wilmington, Massachusetts. Within HQ AFLC, the Command, Control and Communication Division (SMW) of the Logistics Management Systems Center (LMSC) was responsible for the technical management of the project.

As the PPFS effort progressed, a distinct connection between the PPFS project and the Weapon System Management Information System (WSMIS) program developed. WSMIS is currently being developed as the primary information system to support several major groups of AFLC Managers. The evolution of the PPFS project included its incorporation into the WSMIS program, with specific ties to the WSMIS Get-Well Assessment Module (GWAM). A list of PPFS and WSMIS/GWAM project references is presented below.

Product Performance Feedback System (PPFS) Management Plan, Dynamics Research Corporation, E-9540-U, 15 March 1985

Product Performance Feedback System (PPFS) Project Status Report and Program Milestones, Dynamics Research Corporation,

E-9552-U,	12 November 1984
E-9609-U,	12 December 1984
E-9666-U,	12 January 1984
E-9712-U,	12 February 1985
E-9789-U,	12 March 1985
E-9861-U,	10 April 1985
E-9959-U,	10 May 1985
E-10036-U,	10 June 1985

AFLC WSMIS Ogden Working Group Minutes, Dynamics Research Corporation, E-9875-U, 12 April 1985

WSMIS Functional Description, Appendix C: Get-Well Assessment Module, E-9704-U, Dynamics Research Corporation, 15 February 1985

Product Performance Feedback System (PPFS) Test Plan, Dynamics Research Corporation, E-9690-U, 1 March 1985

Product Performance Feedback System (PPFS) Test Analysis Report, Dynamics Research Corporation, E-9877-U, 29 April 1985

Automated AFLC Form 74 (Release 1.0) Program Maintenance Manual, Dynamics Research Corporation, E-9879-U, 29 April 1985

Automated AFLC Form 74 (Release 1.0) Computer Operations Manual, Dynamics Research Corporation, E-9881-U, 29 April 1985

Automated AFLC Form 74 (Release 1.0) Training Material, Dynamics Research Corporation, E-9880-U, 29 April 1985

Automated AFLC Form 74 (Release 1.0) Users Manual, Dynamics Research Corporation, E-9878-U, 29 April 1985

Product Performance Feedback System (PPFS) Final Report, Dynamics Research Corporation, E-9876-U, 9 May 1985

WSMIS Preliminary System/Subsystem Specification: Get-Well Assessment Module, Dynamics Research Corporation, E-10112-U, 28 June 1985

1.3 TERMS AND ABBREVIATIONS

A complete listing of terms and abbreviations relating to this project is presented below.

ADP	Automated Data Processing
AFLC	Air Force Logistics Command
CDRL	Contract Data Requirements List
DRC	Dynamics Research Corporation
GWAM	Get-Well Assessment Module
IM	Item Manager
LIMFAC	Limiting Factor
LMSC	Logistics Management Systems Center
MIS	Management Information System
PPFS	Product Performance Feedback System
RFP	Request for Proposal
SIMSPO	Simulator System Program Office
SOW	Statement of Work
SPM	System Program Manager
VAMOSC	Visibility and Management of Operation and Support Costs
WSMIS	Weapon System Management Information System

SECTION 2 - PROGRAM OVERVIEW AND SUMMARY

2.1 PROGRAM OVERVIEW

The Product Performance Feedback System (PPFS) originated in response to a need for a convenient, systematic Automated Data Processing (ADP) tool to feed back to the design community the lessons learned during the operational phase of a weapon system. The concept of PPFS was developed in accordance with AFR 800-13 (Air Force Feedback Program) in order to perform the following functions:

- Provide feedback to the user of certain design-related operational, maintenance, and reliability data, indicating the performance of a weapon system in the field;
- Relate operational performance data to current design data in order to check actual system performance against original design goals; and
- Relate actual cost to the level of performance of a given weapon system.

Originally, the PPFS study proposed to accomplish these functions in two phases. The first phase involved the definition of a system that would function as a conduit between AFLC data systems and the design communities. The second phase involved the actual development of a prototype work station to demonstrate the PPFS concept and stimulate feedback from the appropriate user communities.

Two major objectives were defined in the final modification of the PPFS contract. The first objective was to expand the prototype PPFS work station in order to address Simulator System Program Office's (SIMSPO) objectives of improving simulator availability prior to the implementation of the Contractor Logistics Support (CLS) contracts. This effort included the development of the Automated AFLC Form 74 - Critical Item/ Warstopper (D087) Data Sheet. The second objective was to develop a preliminary system/subsystem specification for the WSMIS Get-Well Assessment Module (GWAM).

2.2 BACKGROUND

The Product Performance Feedback System contract was awarded to Dynamics Research Corporation (DRC) on 14 June 1983 on the basis of DRC's 6 May 1983 Proposal. The contract was divided into two phases as defined in the original RFP/SOW. DRC initiated work on Phase I of the study immediately after receiving notification of the contract award.

The purpose of the first phase of the contract was to evaluate the PPFS concept and determine the feasibility of implementing the concept. The overall concept is to use a structured methodology consisting of a consolidated data base and an integrated set of analytic tools, and systematic procedures for feeding back information to the system designers for decision-making and planning.

During Phase I, it became clear that the microcomputer work station version was a unique and revolutionary concept that represented an information system rather than a data system. Potential PPFS users would require a comprehensive prototype to

test and evaluate its unique features. The decision was made to build a demonstration work station system on an IBM PC-XT microcomputer in order to introduce the work station concept to the user community.

The comments resulting from the demonstration of the comprehensive prototype were very favorable. Based on these comments, the comprehensive work station approach became the foundation of the prototype design detailed in DRC's 13 February 1984 Program Plan, Product Performance Feedback System (PPFS) Phase II: Prototype PPFS, E-9140-U. This Program Plan described the conversion of the static demonstration to a fully working demonstration system.

About the same time, the Weapon System Management Information System (WSMIS) was being developed. One of WSMIS's modules had a purpose similar to that defined in the PPFS concept. The concurrent development of WSMIS and the redirection of the PPFS effort from the original SOW dictated a revised SOW of 25 July 1984 in order to clarify the contract. DRC responded with the Technical Proposal for the Redirection of the Product Performance Feedback System (PPFS),SG-2755F, 17 August 1984.

Several major changes to the contract were incorporated in this new proposal. The comprehensive work station concept, developed on a microcomputer, was formally defined. DRC was directed to continue development of the prototype on a Zenith Z-100 microcomputer rather than on the IBM PC-XT microcomputer. The Zenith had been established as the Air Force Standard microcomputer and would become available in increasing numbers throughout the Air Force.

The most significant contract change concerned the relationship of PPFS to the Get-Well Assessment Module (GWAM) of WSMIS. The redirection of the contract specified that the PPFS technology could be used to satisfy the objectives of GWAM. To support this theory, the PPFS prototype was refined to demonstrate the Get-Well process for the Simulator Program Office (ASD/YWB). The proposal defined this demonstration as follows:

- Identify SPM and IM requirements for weapon system Get-Well data and analysis tools;
- Demonstrate the application of PPFS to this Get-Well process; and
- Provide SPMs and IMs with a prototype tool to actually define Get-Well Plans.

In addition to preparing the prototype for the SIMSPO, a preliminary WSMIS/GWAM System/Subsystem Specification was to be prepared under this contract.

SECTION 3 - PROGRAM RESULTS

The final PPFS contract modification contained two specific objectives: 1) to demonstrate to the SIMSPO a prototype system which would assist in the effective management of simulator availability, and 2) to prepare a preliminary WSMIS GWAM System/Subsystem Specification. This section describes the work performed to meet these objectives and the results.

3.1 PPFS/SIMSPO DEMONSTRATION

The first phase in developing an Automated AFLC Form 74 was developing a working prototype of PPFS on an IBM microcomputer. An extensive effort was made to transition the software from the IBM to the AF standard Zenith Z-100 microcomputer. The PPFS technology, resident on the GFE Zenith Z-100 microcomputer, was proposed as a prototype for the data processing requirements for the Simulator System Program Office (SIMSPO) in order to improve simulator availability.

The commonality between WSMIS's and PPFS's objectives became apparent during the investigation into improving the SIMSPO's ability to effectively manage simulator availability. The requirements were 1) to identify those items (limiting factors) which have the greatest impact on simulator availability, and 2) to develop and monitor Get-Well Plans to prevent these items from limiting simulator availability in the future. Thus, the PPFS prototype system, which was demonstrated to the SIMSPO, mirrored, as much as possible, the functions of the WSMIS Readiness Assessment Module (RAM) and the Get-Well Assessment Module (GWAM).

A demonstration of the SIMSPO MIS requirements was held on 26 March 1985 and incorporated both the identification of problem items and the Get-Well process in the PPFS work station. A significant portion of this demonstration was the Automated AFLC Form 74 - Critical Item/Warstopper (D087) Data sheet, which used the microcomputer technology that had been developed as part of the PPFS work station. The Automated Form 74 is in keeping with GWAM's emphasis on automating certain labor intensive data acquisition and analysis tasks.

Based on the demonstration delivered to the SIMSPO, the user community, particularly those IMs responsible for the preparation of the AFLC Form 74, requested that the Automated Form 74 be enhanced to operate on a stand-alone basis.

The Z-100 Automated AFLC Form 74 was proposed as an interim capability prior to the implementation of the mainframe WSMIS/GWAM system. In this manner, the IM community would be provided immediately with an ADP tool to meet its interim needs. The interim Z-100 Automated AFLC Form 74 reduces the time from eight hours to one half hour. Additional file, storage and printing capabilities are also provided. The microcomputer technology, in conjunction with the widespread availability of Z-100 microcomputers throughout the Air Force Logistics Command (AFLC), provides the ideal interim solution to the IMs needs.

This functional portion has been extracted from the PPFS prototype and elevated to the production level in the form of a stand-alone Automated AFLC Form 74 System. A program diskette is now available. The documentation required by the contract was tailored to support this production system rather than to support the SIMSPO demonstration. It was more appropriate to supply a Users Manual, Program Maintenance Manual and Computer Operations

Manual to use with the production Automated AFLC Form 74 system rather than document a one-time demonstration prototype.

The Automated AFLC Form 74 is designed to address the issue of providing timely information necessary for management decision making. Specifically, the Automated AFLC Form 74 consists of a software package designed to run on a stand-along basis on a GFE Zenith Z-100 microcomputer. The software generates an automated form process to assist the IM community in more efficiently preparing, storing, updating and printing pertinent Get-Well data found on the AFLC Form 74 - Critical Item Data Sheet.

The overall system functions as a user-friendly, menu-dirven software package that allows the user to specify tasks relative to the preparation of AFLC Form 74. The system assists the user in such functions as automatically updating and storing an existing database, creating a new database, calculating intermediate asset positions, analyzing the impact of such calculations, and printing a finalized version of the form.

This system was demonstrated at the AFLC Critical Item Conference and is currently being extensively used at the Air Logistics Centers (ALCs) located at Ogden, Utah (OO-ALC), Sacramento, California (SM-ALC), and Warner Robbins, Georgia (WR-ALC). The users have commented that this tool certainly improves their ability to manage critical items and is an effective intermediate solution prior to WSMIS/GWAM.

3.2 WSMIS/GWAM PRELIMINARY SYSTEM SPEC

The second objective of the final phase of PPFS was to prepare the first three sections of the WSMIS/GWAM System/Subsystem Specification. This request gave DRC the opportunity to incorporate the lessons learned from the development of the Automated Form 74 into WSMIS/GWAM.

This objective was satisfied by submitting the WSMIS Preliminary System/Subsystem Specification: Get-Well Assessment Module (E-10112-U) on 28 June 1985. Comments on this document, as yet, have not been received.

SECTION 4 - RECOMMENDATIONS AND CONCLUSIONS

This section recommends an approach to pursuing the original objective of the Product Performance Feedback System, which was to feed back to the design community the lessons learned during the operational phase of a weapon system's life cycle. Stated more simply, the design community needs a methodology/system to determine where and when their technological base should be applied to existing and future weapon systems in order to maximize the improvement in combat capability (performance and supportability) and life cycle cost. This feedback process is critical to developing an optimal technology development investment strategy which relates the "return" (i.e. improved readiness, sustainability cost) with the investment (i.e. type of technology "mix", size of investment).

Fundamental to this methodology is the relationship between the lessons learned and the highest level objectives of combat capability and life cycle cost. It is not adequate or sufficient to recommend that an item be improved as a result of a 400% increase in failures. It must be known if this item is one of the factors limiting the weapon system's readiness, sustainability or performance and/or is a high contributor to life cycle cost. The feedback of lessons learned that are directly related to these objectives will help identify which items most require technological improvement.

Within the Air Force Logistics Command (AFLC), the types of lessons learned which must be fed back are those related to 1) weapon system supportability, including both readiness and sustainability, and 2) operation and support costs. Thus, the

AFLC data systems which should be generating these lessons learned are the Weapon System Management Information System (WSMIS) for readiness and sustainability and the Visibility and Management of Operation and Support Costs (VAMOSC) for operation and support costs. There should be a functional requirement for both of these data systems to accumulate a historical database of the high driving equipment to serve as a source for AFLC lessons learned.

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